

**STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING**

**Wednesday, February 13, 2008
Carnegie Room 315, Time 1:30 pm**

Microbubble Manipulations and Fluidics

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Bubbles are ubiquitous in everyday life. In the past decades since the advent of microfluidic technology, in particular, micro bubbles have been attracting much more attention, not only bringing a great deal of interesting scientific/engineering issues but also providing high potentials in many microfluidic applications. In this talk, a variety of micro bubble operations will be presented along with underlying scientific issues. The first part of the talk will deal with fundamental bubble operations such as transporting, splitting, merging, and on-chip creating/eliminating of microbubbles utilizing the electrowetting and electrolysis principles. Then, the talk will switch gears to more advanced bubble operations in which mobile bubbles are oscillating in harmonic with acoustic excitations. Mobile oscillating bubbles can provide novel microfluidic functionalities such as particle carrier, mobile vortex generator and mixing enhancer. Finally, this talk will briefly discuss about future research directions and possible applications.

Professor Sung Kwon Cho received BS, MS, and PhD degrees In Mechanical Engineering from Seoul National University in 1990, 1992, and 1998. After a post-doctoral research position at UCLA, Professor Cho joined the Department of Mechanical Engineering and Materials Science at the University of Pittsburgh as an Assistant Professor in 2003. Dr. Cho's research focus lies in developing micro/nano devices to efficiently manipulate cells, bio-molecules, functional particles and micro/nano fluids, and in investigating underlying scientific/engineering phenomena in these systems. Topics include, for example, in-droplet concentrator and separators, airborne micro particle samplers, micro bubble actuators, micro bubble pumps, and micro bubble tweezers. Dr. Cho has been carrying out these research projects under many federally-funded supports (NSF, DHS and DOD) as well as local seed grants. His past and current research outcomes have been highlighted in several media; for example, his achievement in digital microfluidics has been recognized in the MSNBC production of "Secret Weapons" (aired on MSNBC on March 16, 2003) by the National Geographic Explorer. His in-droplet separator and particle sampler have been highlighted in the magazines of Chemical Technology (Vol. 3, No. 1, 2006 and Vol. 4, No. 4, 2007) and Chemistry World (web version, March 2007). In addition, Dr. Cho is currently carrying out many collaborative projects with the University of Pittsburgh Medical Center (UPMC) to develop implantable pH sensors for early detection and treatment of myocardial ischemia and functional micro channels for monitoring and controlling of cell migration and for blood flow simulations.

For more information, please contact Prof. Chang-Hwan Choi at cchoi@stevens.edu or 201-216-5579